CLAIMS:

1. A photovoltaic cell module for a receiver of solar radiation-based electrical power generating system, the module including:

(a) one or more than one photovoltaic cell having an exposed surface for solar radiation;

(b) an electrical connection for transferring the electrical energy output of the photovoltaic cell or cells to an output circuit, and

(c) an assembly for extracting heat from the photovoltaic cell or cells, the assembly including (i) a housing positioned behind and in thermal contact with the exposed surface of the photovoltaic cell or cells, the housong including a base and side walls extending from the base, with the base, the side walls and the photovoltaic cell or cells defining a coolant chamber, and the housing including an inlet for supplying a coolant into the chamber and an outlet for discharging the coolant from the chamber, and (ii) a coolant member located in the coolant chamber in heat transfer relationship with the photovoltaic cell or cells, the coolant member including a plurality of beads, rods, bars or balls of high thermal conductivity material that are in thermal contact and have a large surface area for heat transfer and define a three dimensional labyrinth that can conduct heat therethrough away from the photovoltaic cell or cells via the substantial number of heat transfer pathways formed by the thermally connected beads, rods, bars or balls and has a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet.

2. The cell module defined in claim 1 wherein the heat extraction assembly is located wholly behind and does not extend laterally beyond the exposed surface area of the photovoltaic cell or cells.

3. The cell module defined in claim 1 or claim 2 wherein the surface area for heat transfer provided by the beads, rods, bars or balls of high thermal conductivity material is at least 5 times the surface area of the front surface of the mass of beads, rods, bars or balls of high thermal conductivity material that are in direct contact with the substrate.

4. The cell module defined in any one of the preceding claims wherein the coolant member at least substantially occupies the volume of the coolant chamber.

5. The cell module defined in any one of the preceding claims wherein the coolant inlet is located in one side wall of the housing or in the base of the housing in the region of that side wall and the coolant outlet is located in an opposed side wall or in the base in the region of that side wall.

6. The cell module defined in claim 5 wherein the coolant member is shaped so that the coolant chamber includes a manifold in fluid communication with the coolant inlet extending along the inlet side wall and a manifold in fluid communication with the coolant outlet extending along the outlet side wall.

7. The cell module defined in claim 5 or claim 6 wherein the housing includes a weir extending upwardly from the base inwardly of the inlet side wall and defining a barrier to coolant flow across the coolant chamber from the coolant inlet.

8. The cell module defined in any one of claims 5 to 7 wherein the housing includes a weir extending upwardly from the base inwardly of the outlet side wall and defining a barrier to coolant flow from the coolant chamber to the coolant outlet.

9. The cell module defined in any one of the preceding claims wherein the beads, rods, bars or balls of the high thermal conductivity material have a major dimension of 0.8 - 2.0 mm.

10. The cell module defined in any one of the preceding claims wherein the beads, rods, bars or balls of the high thermal conductivity material have a major dimension of 0.8 - 1.4 mm.

11. The cell module defined in any one of the preceding claims wherein the packing density of the beads, rods, bars or balls of the high thermal conductivity material decreases with distance away from the substrate.

12. The cell module defined in any one of the preceding claims wherein the coolant flow passages occupy between 20 and 30 % of the volume of the coolant member.

13. The cell module defined in any one of the preceding claims includes a substrate on which the photovoltaic cell or cells are mounted and to which the housing is mounted.

14. The cell module defined in claim 13 wherein the substrate is formed from or includes one or more than one layer of a material that is an electrical insulator.

15. The cell module defined in claim 13 or claim 14 wherein the substrate is formed from a material that has a high thermal conductivity.

16. The cell module defined in claim 14 wherein the substrate includes a metallised layer interposed between the photovoltaic cell or cells and the electrical insulator layer or layers.

17. The cell module defined in claim 14 or claim 16 wherein the substrate includes a metallised layer interposed between the electrical insulator layer or layers and the coolant member.

18. A method of manufacturing the photovoltaic cell module defined in any one of the preceding claims that includes:

(a) forming the coolant member by supplying a predetermined mass of plurality of beads, rods, bars or balls of high thermal conductivity material into a mould of a predetermined shape and thereafter heating the beads, rods, bars or balls of high thermal conductivity material and sintering the beads, rods, bars or balls of together to form the coolant member;

(b) locating the coolant member in the housing; and

(c) mounting the photovotaic cell or cells to the housing.

19. A method of manufacturing the photovoltaic cell module defined in any one of claims 1 to 17 that includes:

(a) forming the coolant member by supplying a predetermined mass of plurality of beads, rods, bars or balls of high thermal conductivity material into the housing and thereafter heating the beads, rods, bars or balls of high thermal conductivity material and sintering

the beads, rods, bars or balls of together to form the coolant member within the housing; and

(b) mounting the photovotaic cell or cells to the housing, for example by soldering or sintering the substrate to the housing.

20. The method defined in claim 18 or claim 19 includes grinding the surface of the coolant member that forms a contact surface with the substrate to increase the surface area of contact between the beads, rods, bars or balls of high thermal conductivity material and the substrate.

21. A method of manufacturing the photovoltaic cell module defined in any one of claims 1 to 17 includes forming the coolant member by supplying a predetermined mass of plurality of beads, rods, bars or balls of high thermal conductivity material into the housing and locating the substrate on the housing and thereafter heating the beads, rods, bars or balls of high thermal conductivity material and sintering the beads, rods, bars or balls of together to form the coolant member within the housing and bonding the coolant member to the housing and the substrate.

22. A system for generating electrical power from solar radiation which includes:

(a) a receiver that includes a plurality of photovoltaic cells for converting solar energy into electrical energy and an electrical circuit for transferring the electrical energy output of the photovoltaic cells; and

(b) a means for concentrating solar radiation onto the receiver; and

the system being characterised in that the receiver includes a plurality of the photovoltaic cell modules defined in any one of claims 1 to 16, an electrical circuit that includes the photovoltaic cells of each module, and a coolant circuit that includes the heat extraction assembly of each module.